

NIA Project Registration and PEA Document

Date of Submission

Jan 2014

Project Reference Number

NIA_NGGT0048

Project Registration

Project Title

Feasibility Study for Alternative Pipeline Materials

Project Reference Number

NIA_NGGT0048

Project Licensee(s)

National Gas Transmission PLC

Project Start

January 2014

Project Duration

0 years and 7 months

Nominated Project Contact(s)

Cor Bos, box.GT.innovation@nationalgrid.com

Project Budget

£64,000.00

Summary

Alternative pipe materials (composites, multilayer & reinforced thermoplastic) are accepted and widely used in oilfield operations within low to high pressure flow line/gathering line systems for hydrocarbons (e.g. below 20 bar for water, fire water, oil and auxiliary pipe work) and have been in service for many years. Plastics are also now the pipe of choice for low pressure distribution lines; however, while composites and plastics have been used for flow lines, gathering lines and distribution lines, they have yet to be accepted in high pressure hydrocarbon systems. In terms of issues of alternative material, some perceived issues for high pressure natural gas applications currently include performance limitations, susceptibility to third party damage and jointing techniques between existing steel pipelines and alternative materials.

Alternative construction process and technologies screening and technology survey will review available products and processes currently on market, considering technologies such as trenchless technology and rigid reeled pipelines.

The operational performance requirements and screening of options will consist of an outline of current operational requirements for existing pipeline materials and construction processes for use as a baseline/benchmark for initial comparison and a review of current industry standards/specifications for pipelines and pipework not made from carbon steel transporting natural gas and other hydrocarbons. Following this there will be a high level screening of all material, technologies and processes against operational performance requirements with recommendations for which materials, technologies and processes should be taken forward to Phase 2.

It is therefore intended that this scope of work is the initial background research into alternative innovative materials and constructional processes. If the findings from these initial phases indicate a potential for use in the transmission system, further scopes of work will be required.

Third Party Collaborators

ROSEN

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

This project is the first stage of a study to investigate the feasibility of using alternative materials, novel construction processes and technologies for pipelines in the National Transmission Network (NTS). Through research and development into new innovative materials and techniques for high pressure natural gas pipelines there is the potential to drive efficiencies in new pipeline construction on the NTS.

Method(s)

Phase 1 is a screening and technology survey comprising of three tasks:

Task 1 - Alternative pipe materials screening and technology survey

Task 2 - Alternative construction process and technologies screening and technology survey

Task 3 - Operational performance requirements and screening of options

Phase 1 will identify and then screen the available technologies (material and constructional) on the market to identify suitable solutions for further investigation and identify and define National Grid requirements.

Following a stage gate Phase 2 will consist of a detailed feasibility review and gap analysis for each suitable technology. Phase 2 has not been costed at this stage as it will be heavily dependant on the results from Phase 1.

Scope

Alternative pipe materials (composites, multilayer & reinforced thermoplastic) are accepted and widely used in oilfield operations within low to high pressure flow line/gathering line systems for hydrocarbons (e.g. below 20 bar for water, fire water, oil and auxiliary pipe work) and have been in service for many years. Plastics are also now the pipe of choice for low pressure distribution lines; however, while composites and plastics have been used for flow lines, gathering lines and distribution lines, they have yet to be accepted in high pressure hydrocarbon systems. In terms of issues of alternative material, some perceived issues for high pressure natural gas applications currently include performance limitations, susceptibility to third party damage and jointing techniques between existing steel pipelines and alternative materials.

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Objective(s)

To investigate the feasibility of using alternative materials, construction processes & technologies for pipelines in the National Grid Transmission Network.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

To complete a detailed review of alternative innovative materials and constructional processes appropriate to the National Transmission System.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project is a feasibility study that will investigate alternative innovative materials and constructional processes suitable for onshore high pressure natural gas pipelines including collating knowledge of materials and practices used in other industries and applications e.g. offshore oil and gas.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The project is a desk based study taking place at the supplier’s offices in the UK.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

64000

Project Eligibility Assessment Part 1

There are slightly differing requirements for RII0-1 and RII0-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RII0-2 / RII0-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RII0-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

n/a

How the Project has potential to benefit consumer in vulnerable situations:

n/a

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RII0-1 projects only)

National Grid is looking to reduce pipeline unit costs through the use of new technology. There is a 55% sharing factor on any savings below the agreed unit cost price, hence efficiencies are transferred through to the customer. Given the low TRL, it is not expected that new technologies such as composite linepipe on the NTS would be in place before the start of RII0 T2. Assuming National Grid lay 60km per annum of new pipe over the 8 year period, at the agreed unit cost for pipelines over the RII0 period, the total cost is over £800m. A target reduction of 10% (both savings from materials, normally 25% of the overall project cost, and reduced costs from the main works contractor through easier handling and reduced time onsite) would equate to savings in the region of £10m per annum.

Please provide a calculation of the expected benefits the Solution

N/A research project.

Please provide an estimate of how replicable the Method is across GB

The Method will consider new materials, technologies and construction methods suitable for the pipeline network that makes up the National Transmission System.

Please provide an outline of the costs of rolling out the Method across GB.

Unknown at this stage, and variable dependant on the results from this first stage of background research. It is not expected that there would be an increase in costs incurred on pipeline construction projects.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RII0-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

- ☒ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).
- ☒ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

- ☐ A specific novel operational practice directly related to the operation of the Network Licensees system
- ☐ A specific novel commercial arrangement

RIIO-2 Projects

- ☐ A specific piece of new equipment (including monitoring, control and communications systems and software)
- ☐ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven
- ☐ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)
- ☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology
- ☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution
- ☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

Learning generated on novel construction practices in particular could be of benefit to both high pressure pipelines and medium pressure tier pipelines within gas distribution networks.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

This project is aligned to the strategic theme.

- ☒ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

Is the default IPR position being applied?

- ☒ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

n/a

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

n/a

Relevant Foreground IPR

n/a

Data Access Details

n/a

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

n/a

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

n/a

This project has been approved by a senior member of staff

☒ Yes